Mid-Year Review
Rocky Flats Initiative and ASTD Projects

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CLOSURE 2006
ROCKY FLATS CLOSURE PROJECT

D&D Needs

- **In order to close the site by 2006, innovative approaches must be deployed in a number of areas that result in increased efficiencies and/or reducing worker hazards**

- **Relatively mature technologies for specific near term applications are necessary to meet the closure schedule.**

D&D Technology Deployment Areas

- **Containment Systems and Cutting Tools**
  - Improved containment systems for size reduction
  - Improved cutting tools for size reduction of equipment
- **Remote In-situ Size Reduction**
  - Remotely operated system capable of in-place size reduction
- **Decontamination for Shipment and Disposal w/o Size Reduction**
  - Improved decontamination techniques
  - Improved characterization instrumentation
- **Tank Sludge Removal**
  - Non-aqueous, remotely operated techniques
- **Beryllium Monitoring and Characterization**
  - Instrumentation to provide real time monitoring
- **Improved D&D and Radiological Instrumentation**
  - Instrumentation and systems to improve efficiency and safety

Containment Systems and Cutting Tools

- **Improved containment systems to**
  - **remove workers from hazardous environment**
  - **support introduction of more aggressive cutting techniques**

- **Improved cutting to increase efficiency and safety of size reduction**

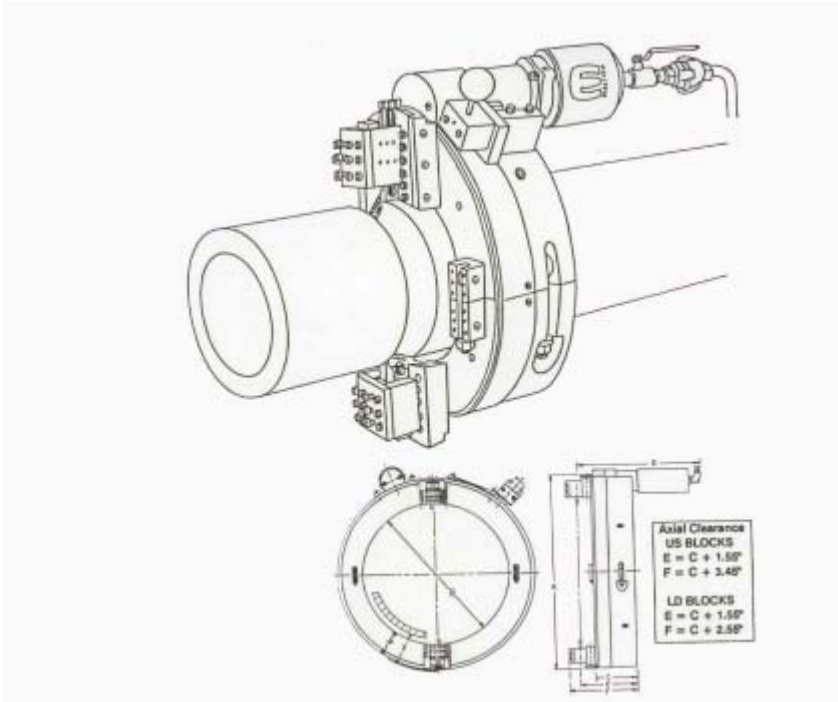
Top: Manual size reduction using power tools in a containment tent

Bottom: Size reduction using plasma arc cutting in a second generation ITC

Containment Systems and Cutting Tools

- **Low profile, light-weight, portable, chipless cutters for removal of highly contaminated glovebox exhaust duct**

- **B771 project alone has over 12,500 ft of round, schedule 10 St-St, glovebox exhaust duct between 2 and 36 inches in diameter**



Conceptual drawing of chipless duct cutter

Containment Systems and Cutting Tools

- **Phase II Inner Tent Chambers (ITC) to remove workers from radiological environment**
  - **Third generation of ITC**
  - **Larger, improved material handling, improved waste handling**

New ITC being used for size reduction

Containment Systems and Cutting Tools

- **Metal-oxygen (magma fusion torch) exothermic cutting for thick metal items**

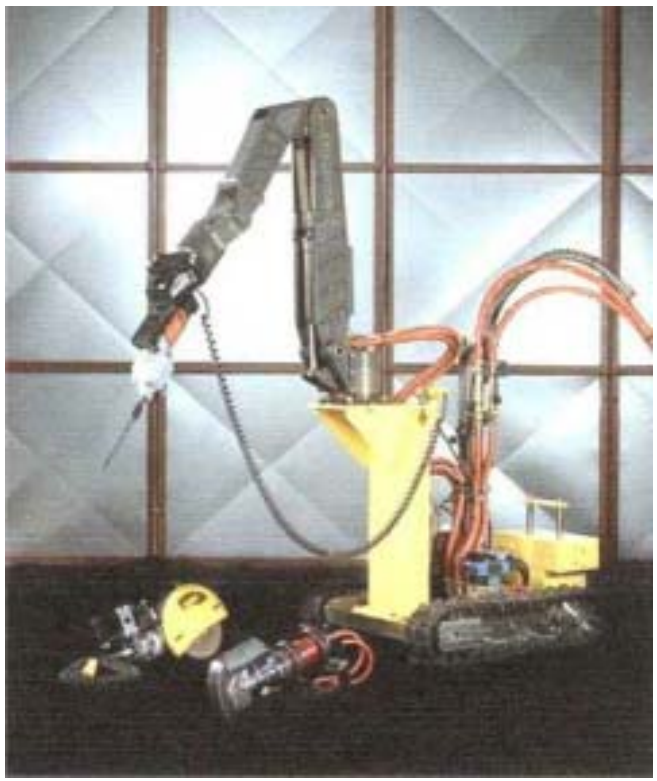
- **Investigation initiated into thick item cutting using cable wire saw**

Trentec Wire Saw

Metal-oxygen exothermic cutting rods for in-situ size reduction of thick material

Remote In-situ Size Reduction System

- **In-situ size reduction systems are installed and operated at the location of the component and remove workers from the hazardous environment.**



In-situ size reduction system primary components: MSRS (top) Houdini (bottom)

Remote In-situ Size Reduction System

- **Due to remote nature of the In-situ system aggressive cutting methods can be employed**

X-Z Tool and Plasma Torch

Decontamination of Equipment

- **Decontamination of plutonium contaminated equipment to avoid (or minimize) size reduction and allow shipment of items as low level waste in large containers**
- **25% or better reduction in TRU waste**

Loading of decontaminated glovebox into SCO II container

Decontamination of Equipment

- **Structural foam for blocking/bracing items in waste containers keeps workers safely away from waste materials**

Foaming waste cargo

Decontamination of Equipment

- **Use of a three step decontamination process to decontaminate gloveboxes to SCO**

- **Shipment of items as SCO is inherently safer and more efficient than size reduction**

Glovebox decontamination nearly complete

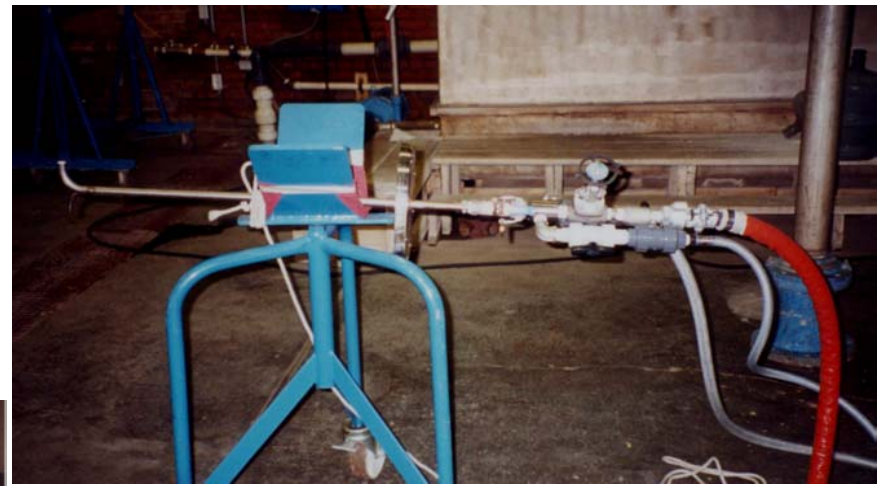
Decontamination of Equipment

- **Closed loop hydrolasing system contains water media and removed material**

Top: Manual (baseline) technique
Bottom: Underside of closed loop system

Decontamination of Equipment

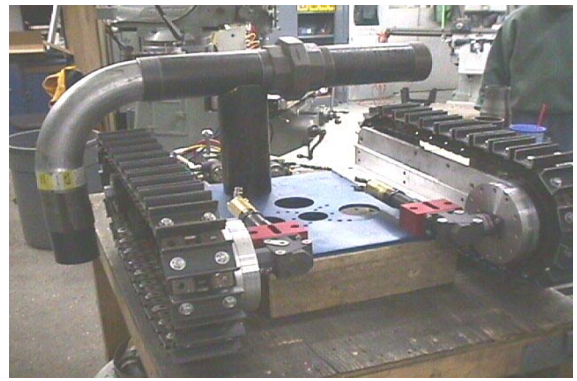
- **Steam injection of cerium nitrate for decontamination of tanks**
- **Non-heated application of cerium nitrate process to decontaminate gloveboxes**



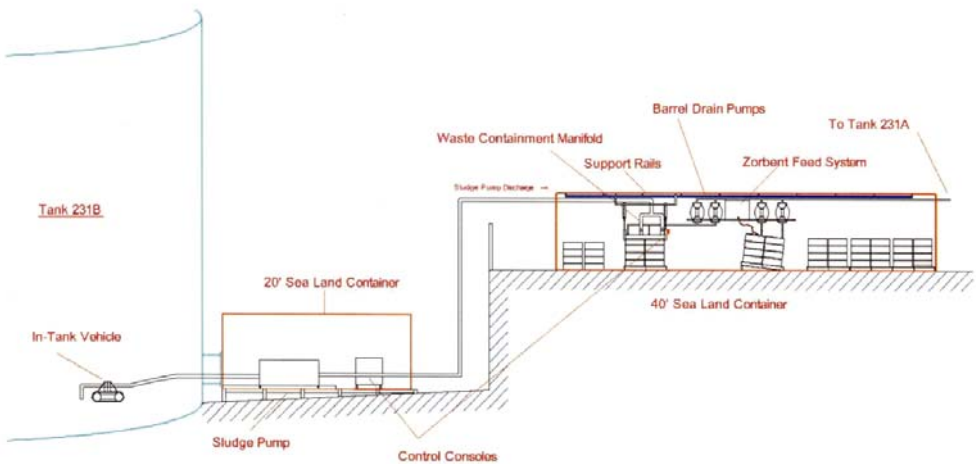
Steam injection system
for cerium IV nitrate

Tank Sludge Removal

- **Tank sludge removal and de-watering without addition of aqueous media**



In Tank Vehicle



Tank 231B schematic

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Tank Sludge Removal

- **1,000,000 gallon tank containing ~30,000 gallons of sludge**

Top: ITV module mounted to tank
Left: Inside of waste module

Beryllium Monitoring and Characterization

Evaluating 3 Technologies

- **Microwave Induced Plasma Spectroscopy**
  - Amzil Unit for Real-Time Air Monitoring
- **Laser Induced Breakdown Spectroscopy (LIBS)**
  - SEA Unit for Air and Swipe Analysis
- **Calorimetric**
  - Oakridge TN method
  - LANL refinements

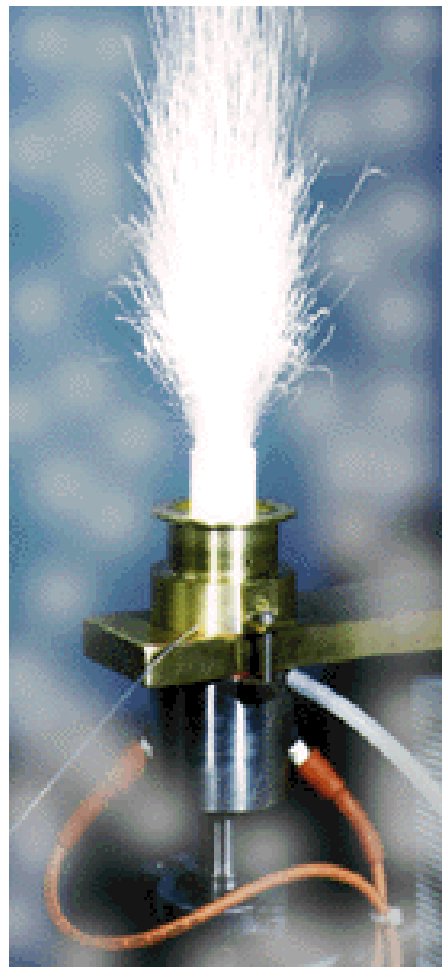
Current Methods (Air Measurement)

- Air pump through a filter
- Submit filter to lab for digestion/ICP
- 3 days to 2 week turnaround
- $20 - $30/sample

Typical Be contaminated equipment

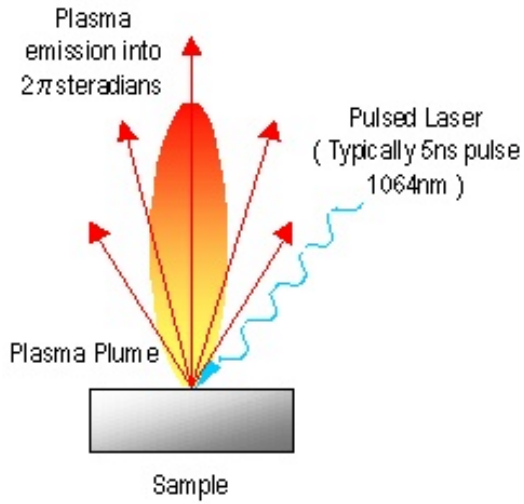
Beryllium Monitoring and Characterization

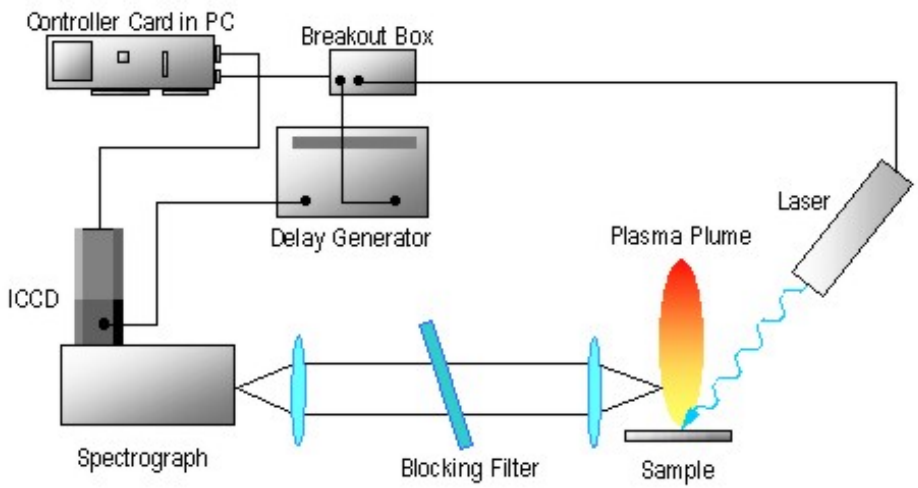
- **Microwave Induced Plasma Spectroscopy**
  - Provide real-time low level quantitative results for air sampling
  - Utilizes a 110V microwave source to generate a plasma directly in the sample air atmosphere
  - Spectrometer used to read the peaks



Beryllium Monitoring and Characterization

- **Laser Induced Breakdown Spectroscopy**
  - Utilizes a laser pulse to generate a plasma "spark" on the sample filter
  - Spectrometer used to read and quantify the peaks generated from the spark
  - Laser and spectrometer are timed to work in unison.





Beryllium Monitoring and Characterization

- **Calorimetric Method**
  - Developed to provide inexpensive, fast, qualitative results for wet surface sampling.
  - Similar methods for sampling as currently in use today.

a) 0 μg Be b) 2 μg Be c) 6 μg Be

d) 9 μg Be e) 19 μg Be

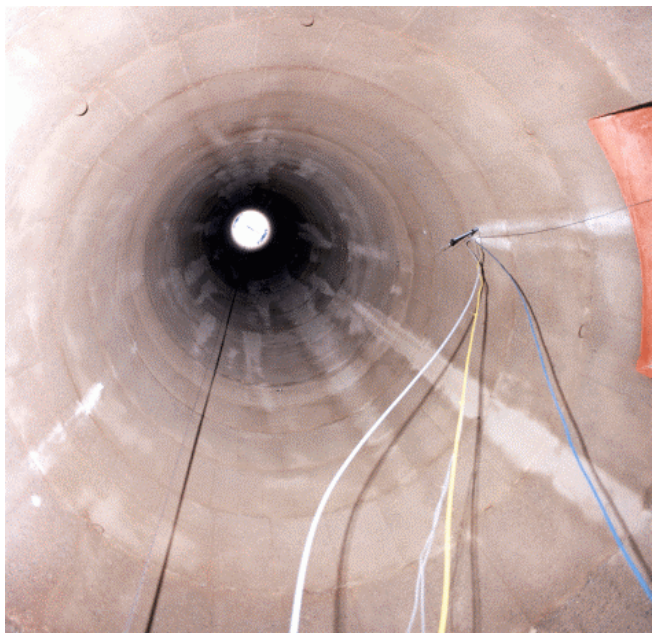
Upgrade D&D Radiological Instrumentation

- **The D&D of Rocky Flats' nuclear facilities requires radiological instrumentation systems which improve the efficiency and safety of radiological measurements taken to support site closure**

Left: Existing surface contamination instrument
Right: Improved surface contamination instrument

Upgrade D&D Radiological Instrumentation

- **Unmanned platform utilized to survey exhaust stack for demolition**
  - **170 ft tall stack ranging from 17 to 6 feet in diameter**
  - **676 measurement points taken**



Left: Inside of stack looking up
Right: setup of survey platform

Upgrade D&D Radiological Instrumentation

- **Large area detector arrays and assist equipment being developed to improve efficiency of Pre-demolition Surveys**
  - **Baseline methodology uses standard hand held instrumentation**

Upgrade D&D Radiological Instrumentation

- **Contamination detector improvements to allow exterior characterization of equipment as SCO**
  - **Investigating new CsI/NaI detector/counter combinations to improve sensitivity**
- **Baseline methodology requires internal access or coupon sampling**

Annular Tanks - possible SCO candidates

FY02 Funding Allocations

- **TTP: RF09DD21 Rocky Flats Initiative**
  - **Beryllium Monitoring/Characterization $500K**
  - **Duct Cutting $380K**
  - **Tank Sludge Removal $200K**
  - **Structural Foam $180K**
  - **Closed Loop Hydrolase System $130K**
  - **Remote In-Situ Size Reduction $50K**
  - **Cable Wire Saw $200K**

- **TTP: RF10DD31 Decontamination**
  - **Cerium Nitrate Decontamination $168K**
  - **Chemical Decontamination $120K**
  - **Remote Sampling & Measurement of Concrete Walls $100K**
  - **Decontamination of Zone I Exhaust Ducting $125K**

FY02 Funding Allocations

- **TTP: RF10DD32 (ASTD) Remote In-Situ Size Reduction**
  - **Remote In-Situ Size Reduction $146K additional to TTP RF19DD21**

- **TTP: RF10DD33 Upgrade Rad Instruments ASTD**
  - **External Characterization for SCO $140K**
  - **Data Integration for D&D Waste Management (Waste Tracker) $60K**
  - **Unmanned Stack Characterization Survey $72K**

- **TTP: RF02DD41 Improved D&D Instrumentation ASTD**
  - **Large Area Detectors $150K**
  - **Direct read Be monitor $300K**
  - **Calorimetric Be Methods $150K**
  - **Large Area Detectors $150K**
  - **Remote Measurement Techniques for Contaminated Structures $400K**
  - **Currently evaluating other potential applications**